FOOD PACKAGING STUDY

Ontario Ministry of Agriculture and Food

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Economics and Policy Coordination Branch
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FOREWORD

This report was compiled by Luisa Tmej of the Economics and Policy Coordination Branch. The report is intended as an overview of this segment of the industry, and the outlook/concern/opportunities for this sector.

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I. INTRODUCTION

This paper provides a brief overview of packaging in the food and beverage sector. The purpose of the package, existing utilization of packaging types, and the movement toward new and innovative packaging will be discussed. The consumer's perceptions regarding packaging types and the industry's responsiveness follows. The trend toward biodegradeable plastics and the present status of this technology in Canada is also presented.

II. OVERVIEW

The food and beverage sector is the largest user of packaging. The increasing use of single serve and small size containers, where packaging accounts for 15 to 20 percent of the retail price of the product, will further expand packaging requirements. (1)

The food package serves a number of purposes. The package protects the product from tampering, maintains quality and affects freshness. The package also establishes an identity for the product in the marketplace which allows companies to enhance brand loyalty.

The traditional types of food packaging - boxes, cartons, metal cans, glass bottles and jars - are increasingly being challenged by new and innovative types of plastic packaging. Accompanying this trend is a change in food processing methods. Yet, the large capital investments required to implement the new types of plastic packaging, coupled with the consumer's lack of knowledge of these new processed products, have allowed the traditional categories to maintain their dominant market positions.

III. HISTORICAL CONSUMPTION TRENDS, CANADA

In 1984, the food and beverage sector spent a total of $2.8 billion on packaging containers and supplies. The greatest component was the boxes and cartons category with $727 million in expenditures. It was followed by metal cans ($714 million) and then glass bottles and jars ($351 million) (Table 1).

The food group (meat, poultry, bakery, confectionary, dairy, fruits and vegetables) accounted for 68 percent of the total expenditure on packaging in the food and beverage sector. The dairy products industry spent the largest percentage on boxes, cartons, and plastic containers. The fruit and vegetable processing industry spent the largest percentage on metal cans and glass containers and was also the only significant purchaser of plastic bottles within the food group. For the meat and poultry industries, the dominant form of packaging was boxes and cartons. The largest purchaser of transparent film bags was the flour, biscuit, and bakery industry (Table 2).

The beverage group purchased a total of $875 million of packaging in 1984. Metal cans, glass bottles/jars, boxes and cartons, listed in order of importance, accounted for 73 percent of the total. The soft drink industry was the largest purchaser of plastic bottles ($29 million) within the entire food and beverage sector.

A report by the National Soft Drink Association (NSDA), exemplified the decline of the glass category in favor of plastic and aseptic packages in the U.S. In 1985, U.S. packaged sales of soft drinks on a unit basis in refillable glass fell by 14 percent, while plastic containers grew by 18.7 percent. Aseptic packages grew by 103.1 percent capturing 0.1 percent of the U.S. soft drink market in just two years.

In 1984, the food and beverage sector spent 6.4 percent more on packaging materials than in 1983. Food packaging expenditures have grown between 6 and 7 percent annually since 1981. The greatest growth category was plastic bottles, with increases of 33 and 25 percent respectively, in 1982 and 1983. The growth of plastic bottles was accompanied by a fall in the usage of glass bottles, by the beverage group (Table 3).

The composition of packaging types within the food and beverage sector, 1984 versus 1983, changed significantly (Table 7). The confectionery industry increased expenditures on boxes and cartons by 31 percent, while decreasing expenditures on metal cans by 27 percent. Another major shift was by the brewery industry which increased expenditures by 53 percent on metal cans while decreasing expenditures by 46 percent on glass bottles, which was partly due to the replacement of the industry standard stubby beer bottle by individual brand bottles. The other food and beverage industries reveal less dramatic but relevant percentage changes of packaging types purchased. Total expenditures on packaging types without reference to individual industries obviates what has been happening in the sector.

IV. THE FUNCTION/ROLE OF THE PACKAGE

The food package serves a number of purposes. More importantly, food is packaged to protect it from being tampered with and to maintain its quality/freshness. However, it is just as important to the food manufacturer for his package to act as a "point-of-purchase salesperson".

The package's structure/shape, material, and graphics can be styled to best target the product to the desired market segment. The manufacturer must respond to changing demographics and lifestyles by changing packaging. As the manufacturer responds to the changing consumer, the cost of the package, and in turn of the product, will be affected.

The package represents a significant portion of the food product's cost. Estimates allot 15 to 20 percent of the retail price of the product to packaging. Due to a number of factors (e.g. the growing use of single servings) this ratio will likely increase in the future.

Product Tampering

Awareness to product tampering has increased significantly over the past few years as a result of recent incidences in the drug industry. Tamper resistance/revealing packaging is playing a greater role in the food manufacturer's packaging decisions.

According to Park Elliot Dietz, a professor of Law, Behavioral Medicine and Psychiatry at the University of Virginia, tampering is the food and beverage sector's "real" problem. When the food manufacturer is confronted with a threat of product tampering, the manufacturer must decide instantly whether to withdraw the product from the market, incur heavy expenditures and possibly discover no true incidence of tampering, or do nothing and run the risk of catastrophe.

In 1985, there were 120 food tampering reports in the U.S. The following year, the number totalled 1,720 of which only 194 were verified. (2)

In addition to this type of malicious product tampering, there also exists tampering by customers and workers curious about the taste and smell of the product. This tampering is particularly evident in the dairy case (e.g. cottage cheese, yogurt). This can be addressed with stricter controls throughout the food distribution channel and improved tamper resistant packaging.

In response, manufacturers are changing their packaging requirements, incurring the added costs of designing and implementing safer and more secure packaging (e.g. button caps that pop up, shrink wrapping a box with plastic). They are also considering using additives that would react by changing colour in the presence of poison. However, the problem of what the manufacturer should do when threatened by product tampering, will persist.

The Cost of Food Packaging

Manufacturing statistics for Canada, 1984, revealed that packaging represented 12 percent of the cost of materials and supplies for the food and beverage sector (Table 4). Within the food group, the meat industry had the lowest expenditure on packaging relative to the total cost of materials and supplies. The fruit and vegetable processing industry had the highest portion of packaging expenditure relative to the total cost of inputs.

For the beverage group, packaging accounted for almost 50 percent of the total cost of materials and supplies. The beverage group, followed by the fruit and vegetable industry, were heavy users of glass bottles and jars. Both of these industries are rapidly increasing their use of plastic containers. Plastic packaging provides a number of advantages over glass (e.g. non breakable, light weight).

The major contributing factor to increasing packaging unit costs is the changing demographic and lifestyle trends. For instance, the time conscious consumer, demanding convenience, is turning toward microwaveable packaged food. With the growing number of single parent families, the trends toward "grazing", and family members eating separately are increasing the use of single serve and small size containers.

Packaging costs, in general, will also increase due to consumer awareness of product tampering which will demand the inclusion of tamper evident or revealing features. The trends toward brand recognition (i.e. more recognizable packaging in contrast to "no-name" products), the escalation of new product introductions, and the competition for retail shelf space will also add significantly to packaging costs.

In 1984, packaging represented 12 percent at the manufacturer's level and between 15 and 20 percent at the retail level. Packaging's importance to the food and beverage manufacturer will increase as the changing demographic/lifestyle trends and the marketing trends are absorbed into the cost equation.

V. TRADITIONAL TYPES OF PACKAGES

Boxes and Cartons

Boxes and cartons are the leading types of packaging in the food and beverage sector, with more than one-quarter of the total packaging market. The dairy products industry spent $138.3 million in 1984 on boxes and cartons, which was 19 percent of the total sector package expenditures. The fruit and vegetable industries and the beverage group spent more on alternate types of packaging.

Over the four year period, 1981 to 1984, the market share of boxes and cartons fell by one percent (Table 5). The confectionery industry revealed the greatest shift from cans to cartons in the 1983/84 period.

Metal Cans

In 1984, the food and beverage sector spent a total of $714.1 million on metal cans, an 8.8 percent increase over 1983. The two largest consumers of metal cans were the fruit and vegetable industry and the soft drink industry. Together, these two industries accounted for 64.2 percent of the total expenditure.

Metal cans comprise one-quarter of the total food and beverage packaging expenditures. This share has remained fairly steady over the past four years. The expenditures on metal cans by the food group dropped slightly, while the expenditure by the beverage group gained market share slightly.

The aluminum can's share of the packaging market has been expanding at the expense of the steel can, particularly within the beverage group. Aluminum cans resist deterioration, are light weight, and recyclable. However, aluminum cans are too expensive for most food products.

The steel can has undergone some technical changes which will better position it against the aluminium can. The weight of the steel can has been reduced and the soldered side seam can replaced by the welded seam in the two piece can. The welded seam removes lead from the container contents and avoids a possible contaminant. In addition, processing times and temperatures have decreased thus minimizing the loss of the product's color and taste within a steel can.

Metal cans offer a number of advantages over other types of packaging. They are retortable, strong and stable, easily portable, and convenient for storage. Metal cans offer a high oxygen barrier which extends the shelf life of a product for more than 1.5 years. More importantly, metal cans offer tamper resistance unmatched by other packaging types. There is no need for double packing, adding inner seals or shrink bands to prevent product tampering. However, consumers do not perceive canned food products to be as nutritious as fresh food products.

Metal cans face growing competition from the onslaught of high barrier plastic packaging. But, according to Flemming Heilmann, Onex Packaging Inc. (Toronto) there is still great potential for metal cans to capture a larger share of the market. He states that 80 percent of beer sales in the U.S. (1986) are in metal cans; in Canada it is only 18 percent, up from 3 percent in 1980. (3)

Glass Bottles and Jars

Within the food and beverage sector, 60 percent of glass bottles and jars are purchased by the beverage group. In 1984, the distillery industry's expenditure on glass bottles was $88.4 million. The second major purchaser of glass was the fruit and vegetable industry with $72.6 million.

Glass bottles and jars experienced the only negative growth in total expenditures, 1984 over 1983, of all packaging types at 2.8 percent (Table 7). In 1984, the market share of glass bottles and jars was 12.7 percent.

The fruit and vegetable industry increased its expenditures on glass bottles and jars in 1984 by 23.9 percent over the previous year. However, the fruit and vegetable industry decreased its expenditures on plastic bottles in 1984 thereby strengthening its preference for glass packaging.

Glass packaging maintains product integrity and image. Even though glass is breakable and heavy, the fact that glass provides the impression of being a quality container suitable for a quality product will enforce glass' position in the food and beverage packaging market. New developments are underway in glass packaging for stronger and lighter weight glass.

Plastic Bottles and Containers

Expenditures by the food and beverage sector on plastic bottles and containers amounted to $142.5 million in 1984. Plastic bottles came on strong in 1982 increasing by 23.9 percent over 1981, but the accelerated pace did not persist. Plastic packaging accounted for only 5.1 percent of the food and beverage packaging market in 1984.

The cost of plastic packaging, coupled with weak tamper proof features and high disposal waste, have hindered its growth prospects. However, technology is expected to override these problems and allow plastic packaging to prosper. Furthermore, Food Production/ Management states that "the fastest growing segments of plastic food packaging will be coextruded high barrier, multilayer bottles, jars and cans, and thermoplastic dual-ovenable entree trays mostly manufactured from crystallized PET". (4) Flexible plastic is also important as packaging for the bakery and confectionery industries.

VI. PACKAGING INNOVATIONS

Packaging technology is reponding to the changing demographic and lifestyle trends. The aging population, two income families, nutrition awareness, and convenience are forcing the development of new packaging for the food and beverage sector.

Aseptic Packaging

Aseptic packaging requires the product to undergo a sterilization process before placement in a presterilized container, under sterile conditions. Numerous food products can be packaged in aseptic containers. Milk, yogurt, cream soups, salad dressings, syrups, soyabean desserts, vegetable oils and tomato sauce are examples of such products.

Aseptic packages are air resistant. Product quality is preserved and taste is maintained. Products packaged in aseptic containers maintain their freshness, often without refrigeration, for months. The containers are generally light weight, convenient, durable, non-breakable, liquid-tight, and easily storable. The aseptic process is more expensive, however the package usually offers cost savings compared to the can and bottle.

Aseptic packaging has been very successful in the beverage industry, creating a completely new market for single portion packages. They are quickly replacing the standard can and glass bottle in the beverage market. In Canada, only liquid juice and dairy products are aseptically packaged. Tetra Pak Inc. (Aurora), an aseptic package manufacturer, had 5.4 percent of the Canadian juice market in 1980. By 1985, the company's share of the juice market increased to 27 percent (Graph 1).

Polyethylene Terephthalate (PET) Containers

A popular packaging container introduced in the late 1970's, into the soft drink industry, was the PET container. By the early 1980's, food products such as vegetable oil, salad dressing, tomato sauce, and more recently peanut butter, were packaged in PET jars.

PET containers are light weight and non-breakable. They are not air tight and they cannot withstand high temperatures. As such, many food products are out of bounds for PET containers. The PET ovenable trays (e.g. Le Menu entrees) offer good heating properties, however, their inefficient gas barrier property affects taste and thus gives the perception that the food is of low quality. The poor oxygen barrier of PET bottles limits the shelf life of carbonated beverages to two months.

Developments to improve the moisture and oxygen barriers of PET containers are underway. The future of PET containers appears to lie with the soft drink market. A PET soft drink can, with an aluminum end, is presently being developed. It still must overcome a number of disadvantages - high cost, heavy weight, difficult to recycle, and shorter shelf life than the aluminum can.

Controlled/Modified Atmosphere Packaging (MAP)

The future of MAP is particularly bright as it responds to the consumer's desire for convenience and for fresh, additive-free foods. Map involves the replacement of air in the package with a mixture of gases. The "appropriate" packaging equipment, film, gas mixture, the appropriate microbiological state of the food product, and adequate temperature control throughout the distribution cycle are required for the process.

MAP has been applied to many different products, (e.g. fruits and vegetables, poultry, red meat) successfully by altering the mix of gases. This type of packaging extends the shelf life of a product, prohibits bacterial and mould growth, reduces moisture loss, slows degradation and ripening, and maintains flavor, colour and texture. Furthermore, the extended shelf life allows for lower equipment and storage costs, fewer deliveries and a wider market distribution.

MAP's disadvantages are the high costs of providing temperature control, and the packaging materials used in the process. This type of packaging must also overcome problems on the consumer side - lack of knowledge and preference for in-store service meat departments.

In Canada, there are 7 or 8 companies using MAP. In Europe, MAP is in common usage. The North American meat industry is about 15 to 20 years behind Germany and 5 to 10 years behind the rest of Europe. (5)

As for the future of MAP, Dr. Aaron L. Brody, (Schotland Business Research) claims that "more food will be packaged under modified atmosphere by the end of this century than will be under aseptic plus flexible and semi-rigid retort packaging".

Microwaveable Containers

The growing popularity of microwave ovens is creating the development of sophisticated microwave packaging innovations. In less than 10 years, the microwave has moved into almost half of all the homes in the U.S.

By 1991, the U.S. market is expected to reach $340 million of microwaveable packaging for prepared food products, an increase of 70 percent over 1986. Entrees, dinners, and pot pies will capture 60 percent of total sales; popcorn and pizza will capture 27 percent. (6)

The best packaging materials for foods to be microwaved are those allowing the waves to pass through without heating the container. Some packages are suited for both microwaves and traditional ovens.

The retort pouch, developed in the late 1950's, has been revitalized by the popularity of the microwave. The retort pouch can be easily distributed, stored, opened, and disposed. It offers improved food quality without preservatives or additives, and responds to the consumer's desire for single servings. Yet, when the pouches were commercially marketed in the U.S. in 1977, these were shunned by the consumer. The consumer did not understand the concept and questioned the reliability of non-refrigerated meat entrees.

Gainers Meats (Edmonton) has introduced a line of entrees in retortable pouches to the St. Louis Missouri area under its Kretschmar label. To improve consumer awareness and acceptance, the product is marketed in the frozen food section along with microwaveable products. The plastic retort pouch provides a one year shelf life and can be boiled in the bag or microwaved. The product line presently consists of cabbage rolls, beef, chicken and tortellini. (7)

One of the newest breakthroughs in microwaveable packaging, developed by Geo. A. Hormel & Co. (Minnesota), is the shelf stable entree. The product is vacuum-packed in a multi-layered, plastic serving dish and sealed airtight with an easy open lid. The package is moisture and oxygen resistant, and maintains the product's integrity. Hormel's "Top Shelf" product line includes dishes of lasagna, beef, chicken, cod, and spaghetti. This new technology is compatible with today's lifestyle.

VII. CONSUMER PREFERENCES/PERCEPTIONS

Overview

The traditional bottled, canned, and frozen food processing techniques are being replaced by new and innovative methods. Aseptic packaging, dual-ovenable packaging, and retort pouches are responding to the changing demographic and lifestyle trends. These new methods offer food with extended shelf lives, higher nutritional content, enhanced quality, and more convenience than their predecessors. However, they require large capital investments, and more importantly they require increased public awareness for acceptance.

Consumers form impressions of the type of packaging most appropriate for certain food/beverage products (e.g. fruit jams packaged in a glass jar, carbonated soft drinks in a can, and milk in a poly container). Along with these impressions, consumers associate certain products with climatic conditions. Meat entrees should be sold in the refrigeration section and not on the store shelf, regardless of its packaging. Finally, consumers perceive certain types of packages, such as glass, to be used for quality products and paper bags for inferior products.

The consumer's purchasing decisions are in response to the consumer's demand for convenience, nutrition, freshness, quality, and single servings. Plastic packaging innovations are responding to these desires. A dramatic shift toward plastic packaging occurred in the beverage industry as it moved away from refillable glass bottles. Wide consumer and beverage processor acceptance, and the food retailers' inconvenience in dealing with returnables, have further stimulated the trend toward plastic bottles. A shift in other industries, such as the fruit and vegetable industry, is also occurring. Consumers consider glass the hardest type of package to dispose of, and as such, the lighter weight non-breakable plastic container is gaining acceptance.

The microwave has responded to the consumer's demand for convenience. The demographic/lifestyle trends exhibit a continued increase in the number of households owning a microwave. Even chocolate fudge ice cream sundaes are being packaged in microwaveable containers.

Many new packaging types have been accompanied by new processing developments. Aseptic processing and modified atmosphere packaging are two prime examples. Both these methods offer the consumer convenience and freshness. Aseptic packaging takes it one step further by responding to the consumer's demand for single portion packaging.

The most significant quality of a food package is its sealability. With each purchasing decision, the consumer examines the product for its physical attributes. For most products, the consumer checks to ensure that it has not been tampered with. For a product such as eggs, the purchaser opens the carton to check for cracked eggs. The egg carton provides for easy opening and closing, and gives the consumer reassurance of quality.

A recent U.S. survey conducted by The Berni Co., Conneticut asked 300 consumers "What types of packaging innovations would you be willing to pay more for?". Only 5 percent replied "none". Better resealability for freshness ranked highest at 74 percent. (8)

Industry Response

Food Engineering's Executive Advisory Board packaging survey, September 1986, asked manufacturer's what was their main preference for new packaging developments. Improved high barrier plastics, with concern over its high price, ranked highest in that survey. This was followed by tamper evident, dual ovenable, aseptic and modified atmosphere packaging.

Environmental concerns over solid waste disposal precipitated Ontario legislation back in 1976 which dictated the percentage of non-returnable soft drink containers which could be offered for sale by retailers. Current legislation maintains the principle of a minimum portion of returnables, but the thrust is on recycling a minimum portion of solid waste -- paper, cans, glass. The new thrust covers more packaging materials and a wider spectrum of the food and beverage sector. In Ontario, recycling and environmental impacts must be addressed in any packaging innovations or risk legislative sanctions.

Both the retailer and the manufacturer prefer metal and plastic containers that are non-returnable. Returnables create inconvenience - too much time and labour is consumed to take back the bottles, refund deposits, temporarily store, and then send back to the manufacturer. Plastic containers can be recycled, but they can not be reused in their original form. In response, the industry has developed plastics that degrade.

The industry is responding to the changing consumer demands. They are undertaking major capital investments to apply the new and innovative processing methods. These new methods and accompaning packaging also offer a number of benefits to the processor. Aseptic and modified atmosphere packaging extend the shelf life of a product and maintain freshness for a longer period than previous packaging types. The distribution perimeter of the processor is thus extended.

The industry is illustrating these new developments on the package, the point-of-purchase salesperson for the product. Package advertising is no longer directed solely toward the contents of the package but toward the attributes of the package. The hottest catch word on today's food and beverage package is "microwaveable".

In addition, the industry is using packaging to create market niches. For instance, orange juice is purchased by one set of consumers in a plastic jug or carton in the refrigeration section, and by another set in aseptic containers from the store shelf. Another example is the impression that packaging gives in terms of quality. Frozen novelties, found four to a box and each individually wrapped, are viewed as a premium product.

The consumer's demand for freshness has had a negative impact on canned food products. Consumers do not perceive canned food products to be fresh and nutritous. Can manufacturer's are attempting to overcome these misconceptions. Their advertisements stress the positive attributes of long shelf life and tamper resistance unmatched by all other types of packaging. In addition, they support an annual "National Can Food Month".

The industry is responding to today's changing times. The demands of the consumer are being met with the implementation of new technologies, both in terms of enhancing old traditional packaging types and in creating new types of packaging.

Importance of Degradability in Plastics

The future growth of plastics packaging will be curtailed unless the problem of solid waste disposal is resolved. Paper, the major form of food packaging today, degrades quite easily and is recyclable. Glass is not degradable but it is recyclable. Metal cans slowly degrade by rusting, and aluminum cans are recyclable. Plastic packaging, as it is used in Canada today, is not degradable.

Recycling appears to be the key to the future, particularly for the beverage market. At present the trade is not enthusiastic about recycling plastics because of the high costs of collecting and recycling what is relatively inexpensive to begin with, and the fact that recycled plastics cannot be used in their original form. Introducing degradablity in the new types of plastic packaging may reduce some environmental concerns but is unlikely to blunt the Ontario recycling thrust. Degradation is not going to allay concerns over litter, land fill sites nor increased volumes of waste, but may reduce environmental impact of improper waste disposal.

The plastic package of the future should perform satisfactorily as a package - should not degrade prematurely and adversely affect the contents - and the degradation process must minimize environmental risks.

There are two degrading processes that apply to plastics.

1. Photodegradation - destruction by ultraviolet light.
2. Biodegradation - destruction by micro-organisms.

EcoPlastics Limited, a subsidiary of Eco Corporation, formerly Ahed Corporation, is on the forefront of degradable plastics. Their product, called EcoLyte, destructs when exposed to ultraviolet light. The plastic product becomes brittle and breaksdown by the natural erosive forces of wind, rain, and water. The small particles that remain are then susceptible to biological degradation.

Ecolyte behaves like ordinary plastic, remains stable, except when exposed to ultraviolet light. Additives are not added to the process; therefore the taste and odor of the food contents will not be affected.

The Toronto-based company is targeting its product to packaged food companies and foodservice outlets. Particular emphasis is on the fast food outlets such as McDonald's and Burger King. Approval is pending from the Food and Drug Administration to allow food packaging with ecolyte plastics.

Eco Corporation has moved into Italian supermarkets. Earlier this year when Italy banned non-degradable plastics, Eco Corporation captured the market by supplying degradable shopping bags to Italian supermarkets. In September 1987, Eco Corporation announced Canadian Safeway, of Winnipeg, had become the first Canadian supermarket in North America to use photo-biodegradable shopping bags.

In addition, Eco Corporation has entered into an agreement with Coca Cola Ltd. to undertake research to develop photodegradable plastic drinking cups and cans.

Another Canadian company on the forefront of degradable plastics is St. Lawrence Starch. The Mississauga-based company has developed a process which uses corn starch as an additive to the making of plastics. Their product, called Ecostar, is biodegradable.

Ecostar is non-toxic, weighs no more than normal plastic, and weighs less than mineral fillers. The plastic biodegrades more quickly in garbage dumps because of the starch particles that are eaten up by soil micro-organisms.

This product offers substantial benefits to the agriculture industry. Hank Krech of St. Lawrence Starch estimates that within five years Ecostar could use 70,000 bushels of corn per day. (10)

Ecostar is cleared for use in food containers in Europe. Todate, the scientific tests have not been accepted in North America. St. Lawrence Starch is seeking both Canadian and American approval for the use of Ecostar in food containers.

VIII. CONCLUSION

Changing lifestyles and demographics have imposed an additional set of criteria for the food and beverage package to satisfy. In the competitive market environment, the package becomes the "point-of-purchase salesperson". The package should reflect the present demands of the consumer, keeping in mind brand recognition.

Canada's food and beverage sector spends approximately $3 billion on packaging each year. In the future, the food package must incorporate additional features (e.g. microwaveable, shelf stable, tamper resistant). As such, annual expenditures will likely increase. Although material costs for some newer package types are lower, inherent more costly processing and distribution costs along with a trend to smaller container sizes have often increased the total process/package cost bill. Both consumers and manufacturers are aware of the advantages of the revolutionary plastic packaging types. This appears to be the future direction of the food and beverage packaging industry.

As the more traditional types of packaging battle it out, for a larger share of the market, the decisions become more complex. The food and beverage manufacturer must decide whether to stay with the old, though improved traditional package or to move towards advanced processes. The packaging component of the manufacturer's decision making process will take on an increasing role.

Table 1: Expenditures on Containers and Other Packaging Supplies, Canada, 1984

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- $ million -				
Food Industries								
Meat & meat products	78.9	18.8	x	-	6.3	x	22.5	169.7
Poultry products	30.7	1.4	x	-	0.8	x	9.9	49.8
Fruit & Vegetable	63.3	235.9	72.6	6.6	3.0	x	7.2	464.9
Dairy products	138.3	66.9	23.9	-	54.3	1.4	30.3	395.0
Flour, biscuit, bakery	91.0	x	1.6	x	2.5	x	37.6	214.1
Confectionery	41.3	0.7	-	-	5.5	-	1.5	83.7
Total Food Industries[1]	574.6	438.9	139.4	13.4	99.2	57.8	124.0	1,898.9
Beverage Industries								
Soft drink	19.6	223.1	50.1	29.0	x	-	-	379.0
Distillery	19.4	-	88.4	-	x	-	-	147.5
Brewery	107.2	52.1	36.4	-	-	-	-	294.4
Wine	6.2	-	37.1	-	-	-	x	54.5
Total Beverage Industries ...	152.5	275.2	211.9	29.0	0.9	-	x	875.4
TOTAL FOOD & BEVERAGE	727.0	714.1	351.3	42.4	100.1	57.8	124.0	2,774.3

[1] Includes Feed Industries.
x confidential
- too small
Source: Consumption of containers and other packaging supplies by the manufacturing industries, 1984, Cat. 31-212, Statistics Canada, January 1987.

Table 2: Percent Expenditures by Packaging Type and Industry, Canada, 1984

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- percent -				
Food Industries								
Meat & meat products	10.8	2.6	-	-	6.3	-	18.1	6.1
Poultry products	4.2	0.2	-	-	0.8	-	8.0	1.8
Fruit & Vegetable	8.7	33.0	20.7	15.6	3.0	-	5.8	16.8
Dairy products	19.0	9.4	6.8	-	54.2	2.5	24.5	14.2
Flour, biscuit, bakery	12.5	-	0.5	-	2.5	-	30.4	7.7
Confectionery	5.7	0.1	-	-	5.5	-	1.2	3.0
Total Food Industries[1]	79.0	61.5	39.7	31.7	99.1	100.0	100.0	68.4
Beverage Industries								
Soft drink	2.7	31.2	14.3	68.3	-	-	-	13.7
Distillery	2.7	-	25.2	-	-	-	-	5.3
Brewery	14.7	7.3	10.3	-	-	-	-	10.6
Wine	0.9	-	10.6	-	-	-	-	2.0
Total Beverage Industries ...	21.0	38.5	60.3	68.3	0.9	-	-	31.6
TOTAL FOOD & BEVERAGE	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Includes Feed Industries.

Table 3: Expenditures on Containers and Other Packaging Supplies, Canada, 1981-1984

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- $ million -				
1981								
Food & Beverage Sector	626.1	592.3	322.3	24.8	81.6	45.1	125.6	2,299.3
1982								
Food & Beverage Sector	667.6	621.7	347.0	32.8	92.9	49.2	114.4	2,459.2
% chg 1982/81	6.6	5.0	7.6	32.6	13.8	9.1	-8.9	7.0
1983								
Food Industries	550.3	420.2	129.1	13.4	97.6	53.3	112.6	1,795.3
Beverage Industries	153.6	236.3	232.2	27.739	0.8	-	x	812.2
Total Food & Beverage	703.9	656.5	361.3	41.2	98.4	53.3	112.6	2,607.5
% chg 1983/82	5.4	5.6	4.1	25.3	5.9	8.3	-1.6	6.0
1984								
Food Industries	574.6	438.9	139.4	13.4	99.2	57.8	124.0	1,898.9
Beverage Industries	152.5	275.2	211.9	29.0	0.9	-	x	875.4
Total Food & Beverage	727.0	714.1	351.3	42.4	100.1	57.8	124.0	2,774.3
% chg 1984/83 - Food	4.4	4.4	8.0	0.1	1.6	8.4	10.1	5.8
% chg 1984/83 - Beverage	-0.7	16.5	-8.7	4.5	17.5	-	-	7.8
% chg 1984/83 - Total	3.3	8.8	-2.8	3.0	1.7	8.4	10.1	6.4

Source: Statistics Canada, (613/991-3510).

Table 4: Cost of Packaging vs. Total Cost of Materials & Supplies, Canada, 1984

	Total Cost of M & S used	Cost of Packaging	Packaging as a % of Total Cost
		- $ million -	
Food Industries			
Meat & meat products	6,759.6	169.7	2.5
Poultry products	1,090.0	49.8	4.6
Fruit & Vegetable	1,248.3	464.9	37.2
Dairy products	4,645.2	395.0	8.5
Flour, biscuit, bakery	1,576.8	214.1	13.6
Confectionery	385.8	83.7	21.7
Total Food Industries[1]	22,106.4	1,898.9	8.6
Beverage Industries			
Soft drink	886.3	379.0	42.8
Distillery	310.8	147.5	47.4
Brewery	521.9	294.4	56.4
Wine	112.0	54.5	48.6
Total Beverage Industries	1,811.1	875.4	48.3
TOTAL FOOD & BEVERAGE	23,917.5	2,774.3	11.6

[1] Includes Feed Industries.

Source: Principle Statistics by Major Group and Industry, Statistics Canada, and Cat. 31-212.

Table 5: Percent Market Shares of Packaging Types, Canada, 1981-1984

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- percent -				
1981								
Food & Beverage Sector	27.2	25.8	14.0	1.1	3.6	2.0	5.5	100.0
1982								
Food & Beverage Sector	27.1	25.3	14.1	1.3	3.8	2.0	4.7	100.0
% chg 1982/81	-0.3	-1.8	0.6	23.9	6.4	2.0	-14.8	
1983								
Food Industries	30.7	23.4	7.2	0.7	5.4	3.0	6.3	68.9
Beverage Industries	18.9	29.1	28.6	3.4	0.1	-	-	31.1
Total Food & Beverage	27.0	25.2	13.9	1.6	3.8	2.0	4.3	100.0
% chg 1983/82	-0.6	-0.4	-1.8	18.2	-0.1	2.1	-7.2	
1984								
Food Industries	30.3	23.1	7.3	0.7	5.2	3.0	6.5	68.4
Beverage Industries	17.4	31.4	24.2	3.3	0.1	-	-	31.6
Total Food & Beverage	26.2	25.7	12.7	1.5	3.6	2.1	4.5	100.0
% chg 1984/83 - Food	-1.3	-1.3	2.1	-5.4	-3.9	2.5	4.1	
% chg 1984/83 - Beverage	-7.9	8.0	-15.3	-3.1	9.0	-	-	
% chg 1984/83 - Total	-2.9	2.2	-8.6	-3.1	-4.4	1.9	3.5	

Table 6: Expenditures on Containers and Other Packaging Supplies, Canada, 1983

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- $ million -				
Food Industries								
Meat & meat products	76.6	18.8	x	-	5.5	x	20.4	163.2
Poultry products	28.8	1.3	x	-	0.8	x	9.3	45.9
Fruit & Vegetable	57.7	227.1	58.6	7.0	2.0	x	6.2	428.8
Dairy products	135.1	53.5	x	-	56.1	x	25.3	370.4
Flour, biscuit, bakery	86.0	x	x	x	2.1	25.4	36.6	202.7
Confectionery	31.6	1.0	-	-	5.3	-	x	79.0
Total Food Industries[1]	550.3	420.2	129.1	13.4	97.6	53.3	112.6	1,795.3
Beverage Industries								
Soft drink	19.4	202.2	42.2	27.7	x	-	-	341.0
Distillery	16.7	-	85.9	-	x	-	-	142.5
Brewery	112.0	34.1	67.7	-	-	-	-	276.5
Wine	5.5	-	36.4	-	-	-	x	52.3
Total Beverage Industries	153.6	236.3	232.2	27.7	0.8	-	x	812.2
TOTAL FOOD & BEVERAGE	703.9	656.4	361.3	41.2	98.4	53.3	112.6	2,607.6

[1] Includes Feed Industries.

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Source: Consumption of containers and other packaging supplies by the manufacturing industries, 1983, Cat. 31-212, Statistics Canada, January 1986.

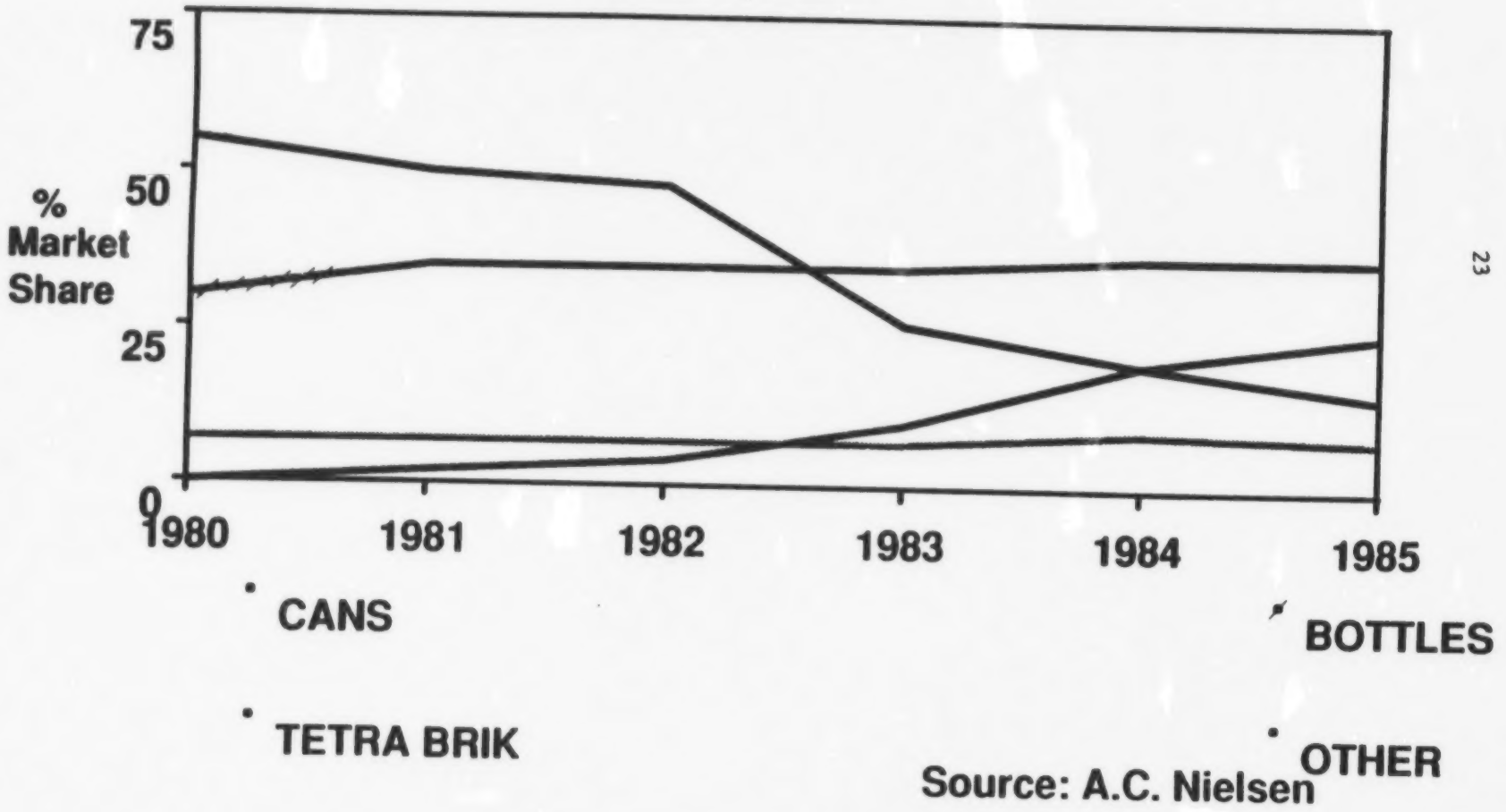
Table 7: Percent Change of Expenditures on Containers and Other Packaging Supplies, 1984/83

	Boxes & Cartons	Metal Cans	Glass Bottles & Jars	Plastic Bottles	Plastic Containers	Paper Bags	Transparent film, Bags	Total Expenditures
				- percent -				
Food Industries								
Meat & meat products	3.0	-0.1	-	-	13.3	-	10.4	4.0
Poultry products	6.6	13.9	-	-	11.6	-	6.3	8.4
Fruit & Vegetable	9.8	3.9	23.9	-4.7	46.1	-	17.1	8.4
Dairy products	2.4	25.2	-	-	-3.1	-	19.9	6.7
Flour, biscuit, bakery	5.7	-	-	-	19.8	-	2.8	5.6
Confectionery	30.7	-26.9	-	-	3.3	-	-	6.0
Total Food Industries[1]	4.4	4.5	7.9	0.1	1.7	8.4	10.1	5.8
Beverage Industries								
Soft drink	1.1	10.3	18.8	4.5	-	-	-	11.2
Distillery	16.4	-	2.9	-	-	-	-	3.5
Brewery	-4.3	52.8	-46.3	-	-	-	-	6.5
Wine	13.8	-	1.7	-	-	-	-	4.2
Total Beverage Industries ...	-0.7	16.5	-8.7	4.5	12.2	-	-	7.8
TOTAL FOOD & BEVERAGE	3.3	8.8	-2.8	3.0	1.7	8.4	10.1	6.4

[1] Includes Feed Industries.

GRAPH 1:

TETRA BRIK SHARE OF THE CANADIAN JUICE DRINK CONTAINER MARKET



Source: A.C. Nielsen

FOOTNOTES

1. Packaging Magazine, October 1986.
2. Food Engineering, February 1987.
3. Toronto Star, March 12, 1987.
4. Food Production/Management, June 1987.
5. Meat Processing, March 1987.
6. Food Engineering, July 1987.
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10. Farm and Country, April 14, 1987.

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